Goddard Procedures and Guidelines

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TITLE: Director

Responsible Office: 300/Office of Systems Safety and Mission Assurance

Title: CALIBRATION AND METROLOGY

Preface

P1. PURPOSE

This procedure establishes the process for ensuring that inspection, measuring and test equipment is properly calibrated, maintained, and identified.

P2. APPLICABILITY

This Procedure applies to all organizational elements of the Goddard Space Flight Center.

P3. AUTHORITY

GPD 1270.3, GSFC Quality Management System (QMS)

P4. REFERENCES

a. NMI 5330.9, Metrology-Calibration and Measurement Processes

b. NHB 4200.1, NASA Equipment Management Manual

c. GPG 1270.4, Quality System

P5. CANCELLATION

a. GMI 5330.8, Metrology and Calibration

b. GHB, 5330.8, Metrology and Calibration

Procedure

1. DEFINITIONS

a. Inspection, Measuring, and Test Equipment (IMTE) – IMTE are instruments and standards used for measurements and inspection and test procedures performed on Product and auxiliary apparatus, such as bench test setups.

b. Calibration - A comparison between two instruments or devices, one of which is a standard of known accuracy, to detect, correlate, report, or adjust deviations in the accuracy of the instrument being compared.

c. Calibration Interval - The established time interval between calibrations of standards and IMTE. The interval may be determined and adjusted periodically by reviewing tolerance data, usage, historical data, vendor specifications, and other relevant information.

d. Calibration Recall System - A system that ensures IMTE and standards are recalled for calibration in accordance with the calibration intervals.

e. Metrology - The science and technology of measurements.

f. Standards - Devices or instruments that provide the basis for the calibration of IMTE. Standards are defined in terms of their derivation and use.

g. National Standards - Standards maintained by the National Institute of Standards and Technology, or based on intrinsic or natural phenomena that constitute a legal basis for the national measurement system.

h. Reference Standards - The highest accuracy standards maintained within a field installation. These are typically considered one echelon below and traceable to the National Standards in accuracy.

i. Transfer Standards - Standards that are calibrated by Reference Standards and are used to calibrate Working Standards.

j. Working Standards - Standards that are used in the calibration or certification of IMTE.

2. IMPLEMENTATION

2.1 The Office of Systems Safety and Mission Assurance at Greenbelt and the Suborbital Projects and Operations Directorate at Wallops shall establish a metrology and calibration laboratory for IMTE at their respective sites. The laboratory shall;

a. Establish and document calibration intervals for IMTE, including initial calibration requirements for newly acquired items and revised requirements for IMTE found to be out of calibration. Calibration intervals for individual items of IMTE shall be traceable to manufacturer’s instructions, industry practices, and its history and use.

b. Establish, maintain, and operate a Metrology Laboratory containing the appropriate reference, transfer, and working standards and with appropriate traceability to National Institute of Standards and Technology standards.

c. Provide calibration and repair for IMTE, including the maintenance of related records, which shall be the responsibility of the laboratory supervisor.

d. Establish, document, maintain, and operate a Calibration Recall System that identifies IMTE with a User, or Property Custodian where appropriate, and tracks the calibration and maintenance records of IMTE. The System shall generate calibration due notices. Calibration due notices that do not result in calibration actions shall be followed by timely and appropriate inquiries regarding the lack of response. The

laboratory supervisor shall be responsible for maintenance and operation of the Calibration Recall System and its records.

e. Establish, document, maintain, and operate an IMTE labeling system that indicates the calibration status of equipment consistent with the Calibration Recall System records. The system shall include appropriate control numbers and information regarding the date of last calibration and its expiration date, that the equipment must be calibrated before use, or that the equipment cannot be calibrated.

f. Notify Users in writing regarding items of IMTE found to be out of calibration. Notification shall include the current calibration status of the IMTE, observations by Laboratory personnel regarding its condition, and relevant calibration and maintenance history.

2.2 Directorates shall establish and document procedures regarding the calibration, maintenance, storage, and use of IMTE. The procedures shall address at least the following requirements for Users, or Property Custodians where appropriate. Users shall:

a. Ensure that the IMTE is appropriate for the measurements to be made (see GPG 1270.4). This includes verifying the capability and acceptability of test software or comparative references (e.g., test hardware) which are to be used as IMTE, prior to release for production, installation, or servicing. Re-verification intervals of such IMTE shall also be prescribed. Records of verification activity shall be maintained.

b. Properly store and maintain IMTE.

c. Ensure that IMTE is properly calibrated before use.

d. Ensure IMTE is labeled regarding its calibration status. The User shall contact the calibration and metrology laboratory in writing regarding unlabeled IMTE.

e. Develop and implement appropriate control procedures when using IMTE whose calibration status may or will change during a period of use.

f. Respond to calibration due notices from the metrology and calibration laboratory for IMTE in a timely manner. The User shall identify changes in calibration requirements to the metrology and calibration laboratory.

g. Assess the validity of work done with IMTE found to out of calibration and develop, document, and implement additional testing if it is required.

h. Ensure that adjustments to IMTE that may affect its calibration are made only by authorized personnel.

3. RECORDS

a. Auto Recall System Records

b. Calibration and Repair Records

c. User records of the verification of test software and comparative references used as IMTE

Calibration and Metrology Flowchart 1 of 2
Recall System

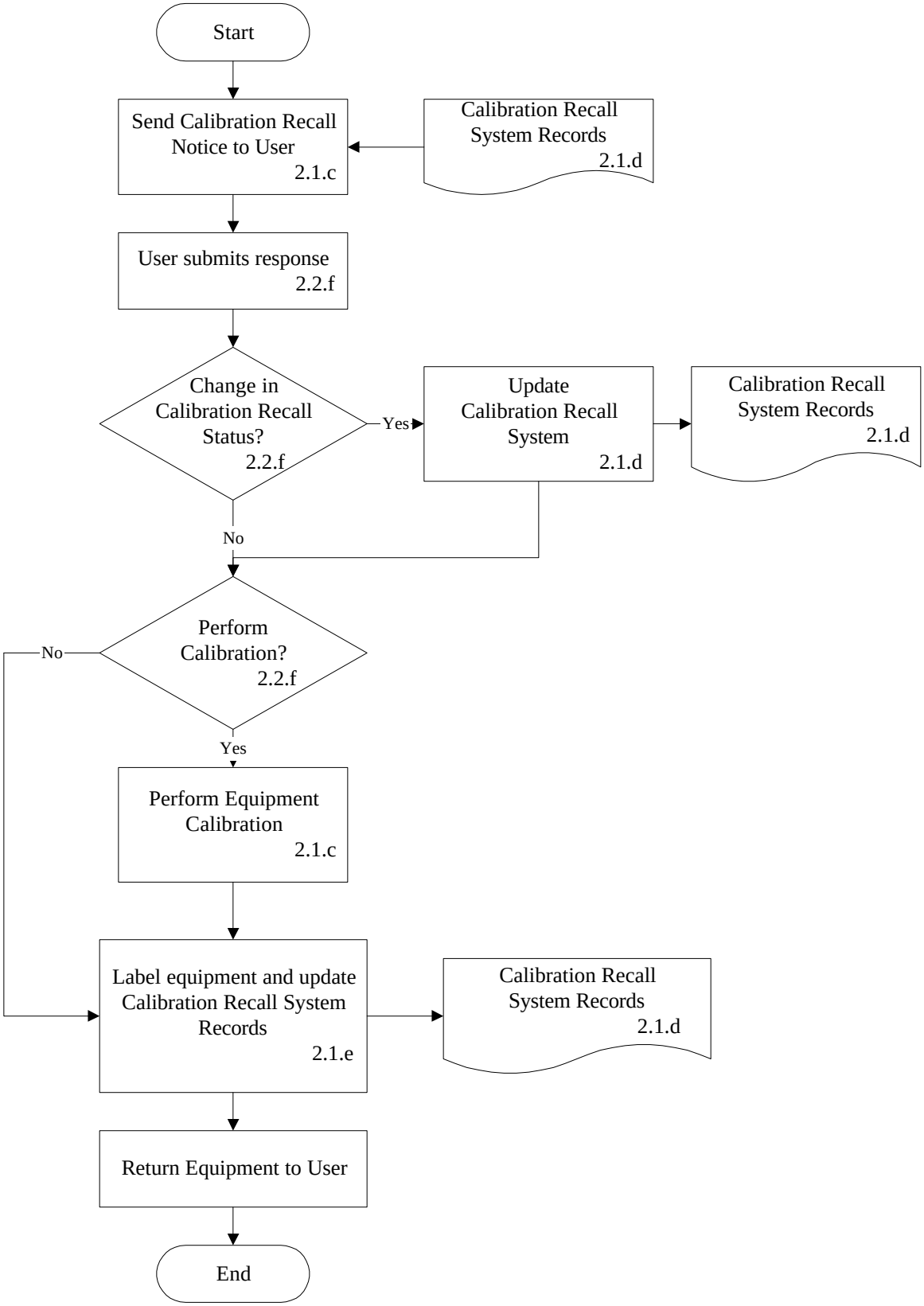

Figure 1

Calibration and Metrology Flowchart 2 of 2
Equipment Calibration Initiated by Using Organizaton

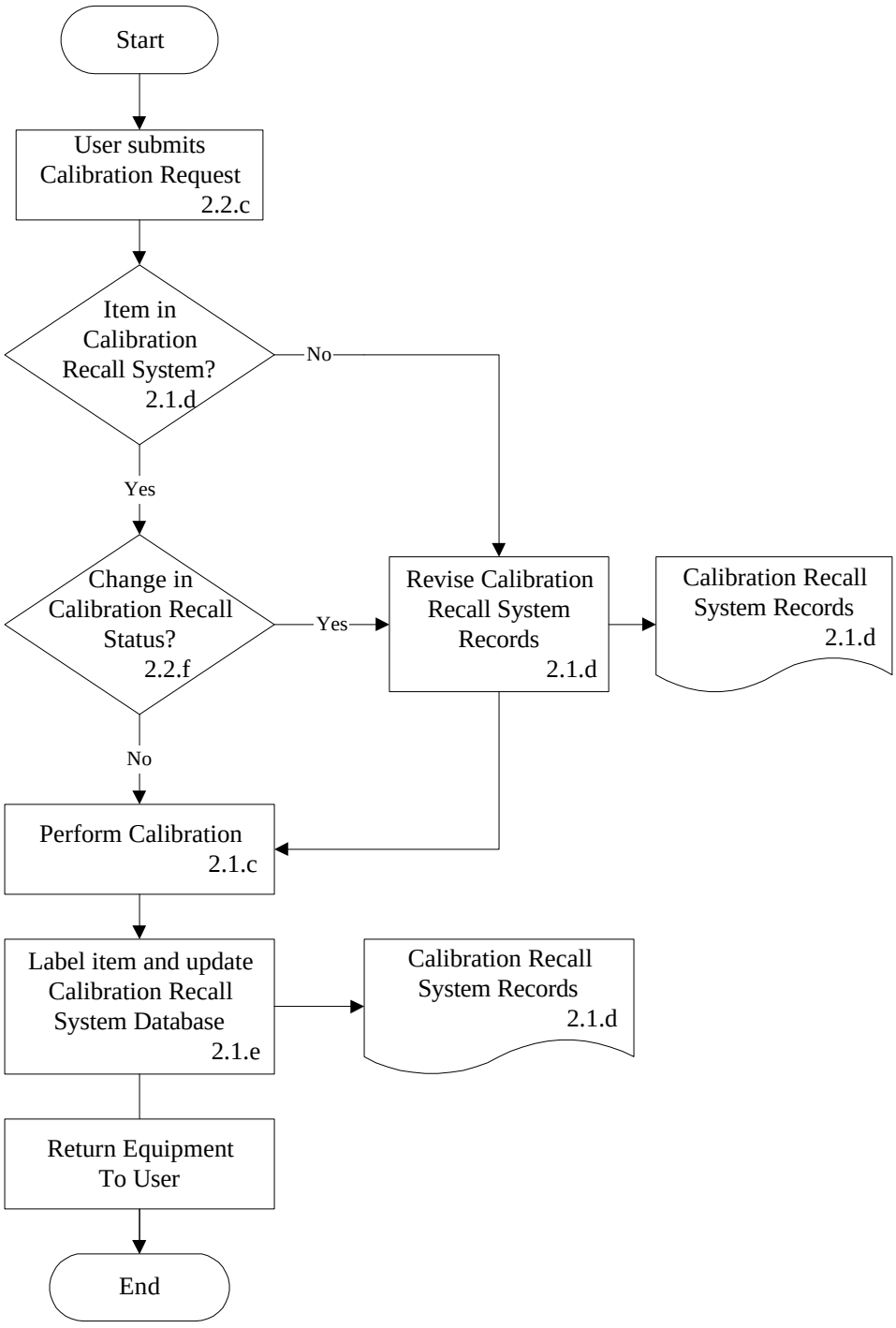

Figure 2